"Corrigenda in Mr. W. Shanks's Tables 'On the Number of Figures in the Reciprocal of a Prime.'" By Lieut.-Colonel ALLAN CUNNINGHAM, R.E., Fellow of King's College, London. Communicated by the Secretaries.

This paper contains the result of an examination of the late Mr. W. Shanks's MS. Tables, with above title, now deposited* with the Royal Society. These tables have been *collated*† with the following printed tables,—

1. 'Periodische Dezimalbrüche,' by H. Bork, Berlin, 1895. The Appendix (pp. 36—41) contains a Table (computed by Dr. F. Kessler) giving the *Residue-Index* ($q$), *i.e.*, the *maximum divisor* yielding $10^{(p-1)\div q} \equiv +1 \pmod{p}$ for every prime ($p$) $\not> 100{,}000$, for which $q > 2$.

2. "Periode des Dezimalbruches für $1/p$ wo $p$ eine Primzahl," by H. Hertzer, printed in Grunert's 'Archiv der Math. und Phys.,' vol. 2, 1902, p. 249. The Table (pp. 249—251) is a *continuation* of the preceding Table for primes up to $p \not> 112{,}400$, and is arranged in the same manner.

Shanks's MS. Tables give the *period-length* (say $\xi$) of $1/p$ for *all* primes from 30,000 to 120,000. The collation was effected by simply multiplying Shanks's value of $\xi$ by Kessler's or Hertzer's value of $q$; the product of $\xi q$ should $= (p-1)$ in every case. The collation was, of course, only possible for such primes as have $q > 2$ (being the only ones shown by Kessler and Hertzer), thus excluding about two-thirds of the total number of primes; the $\xi$, $q$ of these excluded primes are, however, easily computed when required.

By this collation a number of discrepancies (102 in all) were discovered between Shanks's MS. and the printed German tables. The values of $\xi$ have in all these cases been *re-computed*,‡ with the result of detecting *errata*, as follows :—

| | | | | |
|---|---|---|---|---|
| Shanks ..... | $p$ missing 5 ; | $\xi$ wrong 66 ; | total 71 | Total 102. |
| Kessler ..... | $p$ missing 8 ; | $q$ wrong 20 ; | total 28 | |
| Hertzer ..... | $p$ missing 1 ; | $q$ wrong 2 ; | total 3 | |

* Part of the MS., viz., for primes from 30,000 to 60,000, is bound up with a small volume marked *Constants and Primes* (with the Press-mark 103 *d* 15), and the rest, viz., for primes from 60,000 to 120,000, is bound up with the 'Royal Society Archives,' vols. 60, 61. Mr. Shanks's MSS. bear dates as follows :—

For primes 30,000 to 60,000, dated 1875.
For primes 60,000 to 75,000, dated 1876.
For primes 75,000 to 110,000, dated 1877.
For primes 110,000 to 120,000, dated 1880.

† By the writer of this paper, with the help of an assistant (Miss E. Cooper), by permission of the Council of the Royal Society.

‡ By the writer himself, and verified in part by Miss E. Cooper.

The table following gives the *Corrigenda* on Shanks's MS. This list is probably far from complete; there is reason to suspect a good many errors in Shanks's MS. among those primes for which $q \not> 2$, but, as the table has not been published, it did not seem worth while examining these.

*Corrigenda on Shanks's MS. Table III* [*primes from* 30,000 *to* 112,400].

Insert five primes ($p$) *missing* in MS.: 33797, 59369, 94111, 95089, 104383.
Correct the period-lengths ($\xi$) opposite the primes ($p$) as below.

| $p$. | $\xi$. | $p$. | $\xi$. | $p$. | $\xi$. | $p$. | $\xi$. |
|---|---|---|---|---|---|---|---|
| 33,797 | 8,449 | 65,011 | 21,670 | 86,143 | 1,758 | 103,813 | 17,302 |
| 34,871 | 1,585 | 70,001 | 35,000 | 86,323 | 14,387 | 104,381 | 104,380 |
| 42,773 | 289 | 70,867 | 3,937 | 87,121 | 4,840 | 104,383 | 3,866 |
| 43,753 | 14,584 | 70,921 | 3,546 | 87,151 | 2,075 | 104,707 | 17,451 |
| 44,893 | 22,446 | 71,821 | 4,788 | 87,517 | 21,879 | 105,367 | 35,122 |
| 46,153 | 15,384 | 72,559 | 87 | 87,697 | 29,232 | 105,613 | 26,403 |
| 46,649 | 686 | 72,661 | 24,220 | 88,003 | 14,667 | 105,929 | 26,482 |
| 47,093 | 23,546 | 72,871 | 1,735 | 89,689 | 22,422 | 106,031 | 2,305 |
| 47,711 | 1,835 | 72,901 | 8,100 | 92,107 | 6,579 | 106,921 | 2,430 |
| 53,857 | 17,952 | 73,351 | 7,335 | 93,319 | 15,553 | 107,647 | 15,378 |
| 55,021 | 7,860 | 74,413 | 37,206 | 94,111 | 9,411 | 107,837 | 26,959 |
| 55,681 | 9,280 | 74,687 | 214 | 95,089 | 23,772 | 109,441 | 9,120 |
| 55,933 | 27,966 | 78,079 | 3,003 | 95,791 | 15,965 | 110,051 | 22,010 |
| 57,457 | 2,128 | 79,111 | 7,911 | 96,601 | 4,830 | 110,917 | 18,486 |
| 57,493 | 14,373 | 80,347 | 13,391 | 96,911 | 4,405 | 110,969 | 27,742 |
| 58,031 | 4,145 | 82,021 | 16,404 | 98,893 | 24,723 | 111,149 | 148 |
| 59,369 | 14,842 | 85,411 | 17,082 | 101,051 | 2,150 | 112,249 | 14,031 |
| 61,007 | 1,034 | 85,447 | 1,818 | 102,793 | 34,264 | | |